

Claims

1. An actuator arrangement comprising:
 - a body;
 - at least one of a piston assembly and a rod assembly, the assembly being slideably disposed in the body;
 - a sensor arrangement comprising: a sensor, a sensor electronics module, and an interactive element, the interactive element being moveable relative the sensor wherein a position of the interactive element indicative of a position of the at least one of a piston assembly and a rod assembly is communicated to the sensor electronics module through the sensor; and
 - a housing assembly attached to an end of the body and including a sensor pilot portion, the sensor pilot portion in the housing assembly being structured and arranged to sealably receive the sensor electronics module therein, wherein the sensor electronics module is encased within the housing.
2. The actuator arrangement of claim 1, wherein the housing assembly is removably attached to an end of the body.
3. The actuator arrangement of claim 1, wherein the at least one of a piston assembly and a rod assembly includes a rod attached thereto, and the sensor is telescopically received within the rod.
4. The actuator arrangement of claim 1, wherein the sensor pilot portion of the housing and the sensor arrangement include a backup seal arrangement therebetween.
5. The actuator arrangement of claim 1, wherein the sensor pilot portion of the housing assembly defines an opening sized to permit the sensor electronics module to be sealably and removably inserted therein.

6. The actuator arrangement of claim 1, wherein:

the housing assembly includes a housing portion with a first end and a second end, the first end engaging the end of the body; and

the housing assembly further includes a cover disposed in sealed abutment with the second end of the housing portion.

7. The actuator arrangement of claim 1, wherein the housing is integrally attached to the body.

8. The actuator arrangement of claim 1, wherein:

the housing includes a first housing portion and a second housing portion, the first housing portion being connected to an end of the body;

the second housing portion is attached to an end of the first housing portion; and

the second housing portion has a smaller outer diameter than the first housing portion.

9. The actuator arrangement of claim 1, wherein:

the housing includes a first housing portion and a second housing portion, the first housing portion being connected to an end of the body;

the sensor pilot portion is formed at least in part by the second housing portion;

the second housing portion includes a base portion having an outer diameter that is smaller than the outer diameter of the first housing portion;

the second housing portion includes an extension portion extending from the base portion; and

the extension portion extends radially outward beyond a radially outer portion of the first housing portion.

10. The actuator arrangement of claim 9, wherein the extension portion includes a mounting area disposed at a radially outer end thereof.

11. The actuator arrangement of claim 1, further comprising a seal assembly disposed between the sensor electronics module and the pilot portion of the housing assembly.

12. The actuator arrangement of claim 1, further comprising a spacer element provided within the pilot portion, the spacer element being configured and arranged to prevent or inhibit movement of the sensor electronics module in an axial direction within the housing assembly.

13. The actuator arrangement of claim 1, further comprising a compressible compression member disposed axially between the housing assembly and the sensor electronics module.

14. The actuator arrangement of claim 1, wherein:
the housing assembly includes first and second housing portions;
the second housing portion includes a guide portion extending axially therefrom; and
the first housing portion includes a stepped portion configured and arranged to receive the guide portion therein.

15. The actuator arrangement of claim 1, wherein:
the sensor electronics module is encased within a sensor body; and

the sensor pilot portion in the housing assembly is structured and arranged to sealably receive the sensor body therein, wherein the sensor body is encased within the housing.

16. The actuator arrangement of claim 15, further comprising a seal assembly disposed between the sensor body and the housing assembly.

17. The actuator arrangement of claim 16, wherein the seal assembly is disposed between the sensor body and the sensor pilot portion.

18. The actuator arrangement of claim 17, wherein:
the at least one of a piston assembly and a rod assembly is slideably disposed within a piston chamber having fluid therein; and
the seal assembly is configured and arranged to allow substantially no leakage of fluid from the piston chamber through the pilot portion.

19. The actuator arrangement of claim 1, wherein:
the sensor electronics module is encased within a sensor body, and the sensor body is encased within the housing;
the at least one of a piston assembly and a rod assembly is slideable along an axial reference within the body of the actuator arrangement; and
the sensor body is piloted by the pilot portion along the axial reference.

20. The actuator arrangement of claim 19, wherein the sensor body is piloted in axial alignment with the axial reference.

21. The actuator arrangement of claim 19, wherein the sensor body is piloted in an offset position with respect to the axial reference.

22. A trunnion mounted cylinder arrangement comprising:
a body;
at least one of a piston assembly and a rod assembly, the assembly being slideably disposed in the body;

a sensor arrangement comprising: a sensor, a sensor electronics module, and an interactive element, the interactive element being moveable relative the sensor, wherein a position of the interactive element indicative of a position of the at least one of a piston assembly and a rod assembly is communicated to the sensor electronics module through the sensor; and

a housing attached to an end of the body and including a sensor pilot portion, the sensor pilot portion in the housing being structured and arranged to sealably receive the sensor electronics module therein, wherein the sensor electronics module is encased within the housing.

23. A method of operating a fluid cylinder including at least one of a piston assembly and a rod assembly, the assembly being slideably disposed in a body, and a position sensor assembly adapted to be encased within and removably receivable within the fluid cylinder, the method comprising:

moving the at least one of a piston assembly and a rod assembly along an axial reference within the body;

sensing a position of the at least one of a piston assembly and a rod assembly within a sensor portion of the position sensor assembly through communication between the sensor portion and an interactive element connected to the at least one of a piston assembly and a rod assembly;

telescopically receiving the sensor portion within a rod connected to the at least one of a piston assembly and a rod assembly;

transmitting the sensed position to an encased sensor electronics module which is piloted along the reference axis and within a pilot portion of a housing assembly attached to the body; and

allowing substantially no leakage of working fluid between a piston chamber and an area external thereto through a sealed engagement between the housing assembly and the sensor assembly.

24. The method of claim 23, wherein the step of transmitting the sensed position includes transmitting the sensed position to an encased sensor electronics module which is piloted in axial alignment with the reference axis.

25. The method of claim 23, wherein the step of transmitting the sensed position includes transmitting the sensed position to an encased sensor electronics module which is piloted in an offset position with respect to the reference axis.

26. The method of claim 23, wherein the step of allowing substantially no leakage of working fluid includes allowing substantially no leakage of working fluid between the piston chamber and an area external thereto through a sealed engagement between the housing assembly and the position sensor assembly.